

WHAT IS CLAIMED IS:

1. A complementary field effect transistor comprising:

a semiconductor substrate;

an n-type field effect transistor provided on the semiconductor substrate having:

a first gate insulating film containing an oxide including an element selected from the group consisting of group IV metals and Lanthanoid metals, and further containing a compound of the element and a group III element except aluminum;

a first gate electrode provided on the first gate insulating film; and

n-type source and drain regions formed on both sides of the first gate electrode; and

a p-type field effect transistor provided on the semiconductor substrate having:

a second gate insulating film containing an oxide including an element selected from the group consisting of group IV metals and Lanthanoid metals, and substantially containing none of group III element except aluminum;

a second gate electrode provided on the second gate insulating film; and

p-type source and drain regions provided on both sides of the second gate electrode.

2. The complementary field effect transistor according to claim 1, wherein a main component of the first gate electrode and a main component of the second gate electrode are the same.

3. The complementary field effect transistor according to claim 1, wherein the first and the second gate electrodes consist of one of Mo, Co, Ni, Pt, Cu, Pd, W, PtSi, Pd₂Si and NiSi, or an alloy including one of Mo, Co, Ni, Pt, Cu, Pd, and W.

4. The complementary field effect transistor according to claim 1, wherein a concentration of the compound in the first gate insulating film is higher on a side of the first gate electrode than on a side of the semiconductor substrate.

5. The complementary field effect transistor according to claim 1, wherein the first gate insulating film includes positive charge.

6. The complementary field effect transistor according to claim 5, wherein a concentration of the

positive charge in the first gate insulating film is higher on a side of the first gate electrode than on a side of the semiconductor substrate.

7. The complementary field effect transistor according to claim 1, wherein the first gate electrode includes the group III element.

8. A complementary field effect transistor comprising:

a semiconductor substrate;

an n-type field effect transistor provided on the semiconductor substrate having:

a first gate insulating film containing an oxide including an element selected from the group consisting of group IV metals and Lanthanoid metals, and substantially containing none of group V elements and aluminum;

a first gate electrode provided on the first gate insulating film; and

n-type source and drain regions formed on both sides of the first gate electrode; and

a p-type field effect transistor provided on the semiconductor substrate having:

a second gate insulating film containing an oxide including an element selected from the group

consisting of group IV metals and Lanthanoid metals, and further containing a compound of the element and a group V element or aluminum;

a second gate electrode provided on the second gate insulating film; and

p-type source and drain regions provided on both sides of the second gate electrode.

9. The complementary field effect transistor according to claim 8, wherein a main component of the first gate electrode and a main component of the second gate electrode are the same.

10. The complementary field effect transistor according to claim 8, wherein the first and the second gate electrodes consist of one of Mo, Co, Ni, Pt, Cu, Pd, W, PtSi, Pd₂Si and NiSi, or an alloy including one of Mo, Co, Ni, Pt, Cu, Pd, and W.

11. The complementary field effect transistor according to claim 8, wherein a concentration of the compound in the second gate insulating film is higher on a side of the first gate electrode than on a side of the semiconductor substrate.

12. The complementary field effect transistor

according to claim 8, wherein the second gate insulating film includes negative charge.

13. The complementary field effect transistor according to claim 12, wherein a concentration of the negative charge in the second gate insulating film is higher on a side of the second gate electrode than on a side of the semiconductor substrate.

14. The complementary field effect transistor according to claim 8, wherein the second gate electrode includes the group V element or aluminum.

15. A manufacturing method of complementary field effect transistor comprising:

forming an oxide film to be made into gate insulating films including an element selected from the group consisting of group IV metals and Lanthanoid metals on regions for an n-type field effect transistor and a p-type field effect transistor on a semiconductor substrate;

forming a metal film to be made into gate electrodes of the n-type field effect transistor and the p-type field effect transistor on the oxide film; and

introducing group III element except aluminum into the oxide film of the region for the n-type field effect

transistor selectively.

16. The manufacturing method of complementary field effect transistor according to claim 15, wherein the metal film consists of one of Mo, Co, Ni, Pt, Cu, Pd, W, PtSi, Pd₂Si and NiSi, or an alloy including one of Mo, Co, Ni, Pt, Cu, Pd, and W.

17. The manufacturing method of complementary field effect transistor according to claim 15, wherein the group III element is introduced on a side of the metal film in the oxide film.

18. A manufacturing method of complementary field effect transistor comprising:

forming an oxide film to be made into gate insulating films including an element selected from the group consisting of group IV metals and Lanthanoid metals on regions for an n-type field effect transistor and a p-type field effect transistor on a semiconductor substrate;

forming a metal film to be made into gate electrodes of the n-type field effect transistor and the p-type field effect transistor on the oxide film; and

introducing at least one of group V elements and

aluminum into the oxide film of the region for the p-type field effect transistor selectively.

19. The manufacturing method of complementary field effect transistor according to claim 18, wherein the metal film consists of one of Mo, Co, Ni, Pt, Cu, Pd, W, PtSi, Pd₂Si and NiSi, or an alloy including one of Mo, Co, Ni, Pt, Cu, Pd, and W.

20. The manufacturing method of complementary field effect transistor according to claim 18, wherein the one of group V elements and aluminum is introduced on a side of the metal film in the oxide film.